

Pond Sealing or Lining (No.)

Cationic Emulsion-Waterborne Sealant

Definition

Installing a fixed lining of impervious material or treating the soil in a pond mechanically or chemically to impede or prevent excessive water loss.

Scope

This standard pertains to the sealing of ponds with cationic emulsion sealant materials.

Purpose

To reduce seepage losses in ponds to an acceptable level.

Conditions where practice applies

Where water loss from a pond through leakage is, or will be, of such proportion as to prevent the pond from fulfilling its planned purpose, or where leakage can damage land and crops or can cause waste of water or environmental problems, and where a seepage reduction of 70 to 95 percent can adequately solve the leakage problem.

Planning considerations

Water Quantity

1. Effects upon components of the water budget, especially effects on volumes and rates of runoff, infiltration, evaporation, transpiration, deep percolation, and ground water recharge.
2. Variability of the practice's effects caused by seasonal or climatic changes.
3. Effects on downstream flows or aquifers that would affect other water uses or users.
4. Effects on the volume of downstream flow to prohibit undesirable environmental, social or economic effects.
5. Potential use for water management to conserve water.

Water Quality

1. Effects of the movement of sediment, pathogens, and soluble substances carried by seepage water.
2. Effects of this practice on the trapping of nutrients and pesticides and altering their effect on surface and ground water quality.
3. Effects on the visual quality of the pool and downstream water resources.
4. Short-term and construction-related effects on the quality of the pool and downstream water.
5. Effects of water level control on the salinity of soils, soil water or downstream water.
6. Effects of water level control on the temperatures of downstream waters to prevent ~~undesired effects on aquatic and wildlife communities.~~
7. Effects on wetlands or water-related wildlife habitats.

Design criteria

Ponds to be lined shall be constructed to meet SCS standards for irrigation pits or regulating reservoirs (552), irrigation storage reservoirs (436), ponds (378), waste treatment lagoons (359), waste storage ponds (425), or wildlife watering facilities (648), as appropriate.

Soil properties. For electrochemical sealing, soils (in the surface 2 in.) shall have properties approximating the USDA textural soil classification for:

1. Very fine sands, fine sands, medium sands, coarse sands, and very coarse sands.
2. Nonexpansive loamy sand and sandy loam.

If the soil is relatively uniform throughout the entire pond, the seepage rate before sealing shall exceed 1 ft/day, measured vertically. If isolated sections in an area are suspected of causing most of the seepage loss, the seepage rate in the area before sealing shall exceed 1 ft/day.

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The minimum rate of application shall be based on small-scale field tests with infiltration cylinders unless sufficient data are available on the field performance of previously tested soils that are similar in texture and chemical properties to the soil to be sealed.

In the absence of field test results for the soils to be sealed, the minimum application shall be 1 gal/yd².

Plans and specifications

Plans and specifications for sealing ponds with cationic emulsion-waterborne sealant shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

Pond Sealing or Lining

Cationic Emulsion-Waterborne Sealant Specifications

Installation

The area to be treated shall be cleared of vegetation and trash. If practical, a soil sterilant shall be applied to the soil before applying the sealant. Water to be treated must not contain suspended sediment in amounts sufficient to coagulate the waterborne sealant. Dry or newly constructed ponds shall be mechanically compacted.

The sealant material shall be inspected before use. Containers shall be checked to see if any asphalt has settled; settled asphalt cannot be easily remixed. If the emulsion contains lumps of asphalt, it shall not be used.

In dry structures, the sealant shall be added at a uniform rate to the incoming water during filling operations so that all sealant is added and mixed when the pond is filled. During treatment, the pond shall be filled from 6 to 12 in. above the normal operating level. The air and water temperature shall be above 40 degrees F.

If the pond is full, the sealant may be pumped or poured around the periphery of the pond at intervals. Immediately after the sealant is added, however, it must be thoroughly mixed and dispersed in the water by a suitable means, such as circulating the water

with a large-volume pump. A 72-hour residence time shall be allowed for the sealant to deposit on the underlying soil. A water level of 6 to 12 in. above the operating level shall be maintained during the residence.

The pond shall be kept full of water after treatment to prevent weed growth, drying, and weathering damage to the treated surface.

Treated areas must be protected from mechanical damage, such as puncture by livestock trampling, and from plant growth through the treated surface. Areas near the waterline and at points of concentrated surface flow shall be protected against erosion.

Sediment coagulating chemicals, such as gypsum or iron sulfate, shall not be used to clear pond water after treatment.

Materials

The sealant should be a stable o/w emulsion of suitable bituminous, resinous, or polymeric bases having infinite dilutability and good stability after dilution in all fresh waters of any native hardness. (The emulsion must be infinitely dilutable in the water to be treated without causing the asphalt to break.) Discrete sealant droplets shall be able to coalesce at 40 degrees F or above as they deposit on underlying soil.

The sealant must conform to the following specifications and testing procedures (ASTM-D-2397 applicable to the soil sealant):

Specifications—	Cationic soil sealant	
	Minimum	Maximum
Viscosity (Saybolt Furol), 122° F (50° C)	20	100
Settlement, 5 days <i>per</i>	—	5
Particle charge test	Positive	—
Sieve test <i>per</i>	—	-0.10
Distillation ¹		
Oil distillate, by volume of emulsion <i>per</i>	—	3
Residue <i>per</i>	60	—
Test on distillation residue		
Penetration, 77° F (25° C) 100 g (5 s).....	100	200
Ductility, 77° F (25° C) <i>cm</i>	40	—
Solubility in carbon disulfide <i>per</i>	98	—

¹ Evaporation test may be used instead of distillation for percentage of residue and penetration.

Testing procedures—	Test method
Viscosity	ASTM-D-244
Settlement	ASTM-D-244
Particle charge	ASTM-D-244
Sieve	ASTM-D-244
Distillation	ASTM-D-244
Evaporation	ASTM-D-244
Penetration	ASTM-D-5
Ductility	ASTM-D-113
Solubility	ASTM-D-4